



# Newly Released TRMM Version 7 Products, GPCP Version 2.2 Precipitation Dataset and Data Services at NASA GES DISC

Zhong Liu<sup>1,4</sup>, D. Ostrenga<sup>2,4</sup>, W.L. Teng<sup>3,4</sup>, Bhagirath Trivedi<sup>2,4</sup>, and S. Kempler<sup>4</sup>

Email: Zhong.Liu@nasa.gov

<sup>1</sup>George Mason University, <sup>2</sup>ADNET Systems, Inc., <sup>3</sup>Wyle Information Systems LLC, <sup>4</sup>NASA/GSFC, NASA Goddard Earth Sciences Data & Information Services Center (GES DISC), Code 610.2, NASA/GSFC, Maryland 20771, USA

## ABSTRACT

The NASA Goddard Earth Sciences Data and Information Services Center (GES DISC) is home to global precipitation product archives, in particular, the Tropical Rainfall Measuring Mission (TRMM) products. TRMM is a joint U.S.-Japan satellite mission to monitor tropical and subtropical (40°S - 40°N) precipitation and to estimate its associated latent heating. The TRMM satellite provides the first detailed and comprehensive dataset on the four dimensional distribution of rainfall and latent heating over vastly undersampled tropical and subtropical oceans and continents. The TRMM satellite was launched on November 27, 1997. TRMM data products are archived at and distributed by GES DISC.

The newly released TRMM Version 7 consists of several changes including new parameters, new products, metadata, data structures, etc. For example, hydrometeor profiles in 2A12 now have 28 layers (14 in V6). New parameters have been added to several popular Level-3 products, such as 3B42 and 3B43.

Version 2.2 of the Global Precipitation Climatology Project (GPCP) dataset has been added to the TRMM Online Visualization and Analysis System (TOVAS; URL: <http://disc2.nascom.nasa.gov/Giovanni/tovas/>), allowing online analysis and visualization without downloading data and software. The GPCP dataset extends back to 1979.

Results of basic intercomparison between the new and the previous versions of both TRMM and GPCP will be presented to help understand changes in data product characteristics.

To facilitate data and information access and support precipitation research and applications, we have developed a Precipitation Data and Information Services Center (PDISC; URL: <http://disc.gsfc.nasa.gov/precipitation>). In addition to TRMM, PDISC provides current and past observational precipitation data. Users can access precipitation data archives consisting of both remote sensing and *in situ* observations. Users can use these data products to conduct a wide variety of activities, including case studies, model evaluation, uncertainty investigation, etc. To support Earth science applications, PDISC provides users near-real-time precipitation products over the Internet. At PDISC, users can access tools and software. Documentation, FAQ, and user assistance are also available.

Other capabilities include: 1) Mirador (<http://mirador.gsfc.nasa.gov/>), a simplified interface for searching, browsing, and ordering Earth science data at NASA Goddard Earth Sciences Data and Information Services Center (GES DISC). Mirador is designed to be fast and easy to learn. 2) TOVAS. 3) NetCDF data download for the GIS community. 4) Data via OPeNDAP (<http://disc.sci.gsfc.nasa.gov/services/opepdap/>). OPeNDAP provides remote access to individual variables within datasets in a form usable by many tools, such as IDV, McIDAS-V, Panoply, Ferret, and GrADS; 5) The Open Geospatial Consortium (OGC) Web Map Service (WMS) ([http://disc.sci.gsfc.nasa.gov/services/wxs\\_ogc.shtml](http://disc.sci.gsfc.nasa.gov/services/wxs_ogc.shtml)). The WMS is an interface that allows use of the data and enables clients to build customized maps with data coming from a different network.

ALG	V6 -> V7 CHANGES
Metadata	Complete redesign. Metadata elements are grouped; usually a group does not appear in all products. (In V6 all elements were in all products.) Number of scans written in SwathHeader group to allow multiswath products.
L1, L2	Scan Status changes.
L1, L2	Geolocation changed to Latitude, Longitude
LH	New products: 2 TRAIN, 3 SLH, 3 CSH.
1B01	Many variables changed to floats (from scaled integers in V6).
2A12	Complete redesign. Added surface precipitation. New quality flags. Hydrometeor profiles have 28 layers (14 in V6). Profiles are not written per pixel. Instead indexes are written per pixel and used to retrieve a profile from an array.
2A21	Added alternate PIA. Reliability Flag simpler. Many variables changed to floats (from scaled integers in V6).
2A25	Many variables changed to floats (from scaled integers in V6).
2B31	Added surface precipitation, snow profile, graupel profile.
3A12	Added surface precipitation.
3B31	Redesign. Profiles have 28 layers (14 in V6). Grid 0.5° (5° in V6). Added surface precipitation.
3B42	Added gaugeRelativeWeighting
3B43	Added source information, HQ precipitation, IR precipitation



**Mirador**  
Data Access Made Simple

You are here: [Object](#) > [TRMM](#)

Keyword: Projects Science Areas

Data Group	Description	Date Range
Ancillary	TRMM Ancillary data products	2000-02-07 to 2010-11-30
Gridded	Gridded data products from VRS, TM, and PR, at a range of spatial and temporal resolutions	1997-12-01 to 2010-11-01
Ground-based Instrument	Ground-based instrument data products	1995-01-03 to 2010-10-31
Orbital	Orbital data products from VRS, TM, and PR, at the sensor's resolution	1997-12-07 to 2010-11-30
Subset	Parameter, gridded, regional gridded, and coincidence subset data derived from TRMM standard data products	1993-01-01 to 2010-11-30

Product	Description	Date Range
3B42	3-hourly global 3B42 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B43	3-hourly global 3B43 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B44	3-hourly global 3B44 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B45	3-hourly global 3B45 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B46	3-hourly global 3B46 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B47	3-hourly global 3B47 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B48	3-hourly global 3B48 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B49	3-hourly global 3B49 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31
3B50	3-hourly global 3B50 (3-hourly) rain rate (mm/hour) at 3-hourly resolution over a 2.5 degree latitude x 2.5 degree longitude grid	1979-01-01 to 2010-12-31

- Precipitation datasets (left):**
- Standard TRMM products
  - Ancillary products (e.g., merged IR)
  - Ground based instruments
  - Other precipitation products in TOVAS (e.g., Willmott-Matsuura, GPCP, GPCC)
- Other data products (right):**
- Other remote sensing products from different missions (e.g., AIRS, A-Train)
  - Modeling products (e.g., MERRA, GLDAS)

Above left: Precipitation products in Mirador (<http://mirador.gsfc.nasa.gov/>). Above right: TRMM orbital data products.

## TRMM Data Services and Applications

**KDD - Support System**  
Data Request Data Files Products  
Distributed Archival Ingest  
GES DISC

**Simple Subset Wizard (SSW)** <http://disc.gsfc.nasa.gov/SSW/>

**Value-added Products and Services:** Ensuring the unimpeded data flow is directed at actual user needs, helping to solve user problems.

**Outreach As Service and Collaborations**  
Our purpose is not to just push data to users, but to make available potential solutions to users' problems.

**Example Applications (Agriculture):**  
United Nations World Food Programme  
USDA Foreign Agricultural Service

Agriculture Information System (AIS)

Current Conditions Maps

## NEW! GPCP Version 2.2 Precipitation Dataset in TOVAS Now

The Global Precipitation Climatology Project (GPCP) has released its latest version, 2.2.

- Temporal Coverage:**
- Monthly precipitation from Jan. 1979 through Dec. 2010
  - Long term monthly means, derived from the monthly data

- Spatial Coverage:**
- 2.5 degree latitude x 2.5 degree longitude global grid
  - 88.75 N - 88.75 S, 1.25 E - 358.75 E

**Monthly Global Precipitation (GPCP)**  
The Global Precipitation Climatology Project (GPCP) provides a global merged rainfall analysis for research and applications. This interface is designed for visualization and analysis of the GPCP's Global Precipitation Version 2.2 (GPCP2.2).

Alert: A new window may be opened when a link or a button is selected below.

Click and drag to select area, or input latitudes (90, 90) and longitudes (-180, 180) or latitude and longitude ranges.

Users can generate plots or ASCII Output for area average (lat-long map), time series (Time Series), and histogram diagram. The generation is available for ASCII Map. Selecting any of the Help buttons will open a new window with detailed help. [More details about the data are also available.](#)

Alert: A new window may be opened when a link or a button is selected below.

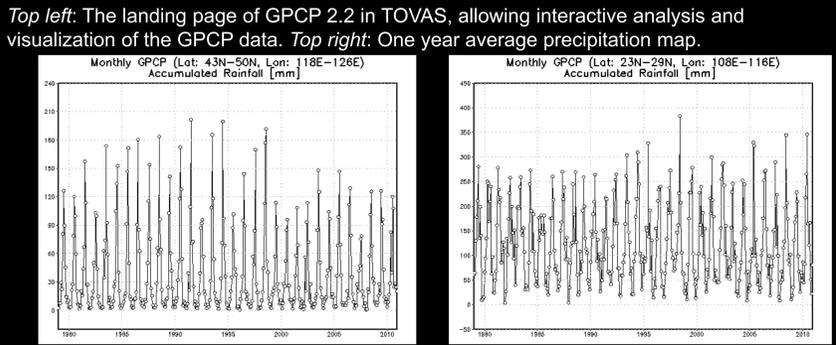
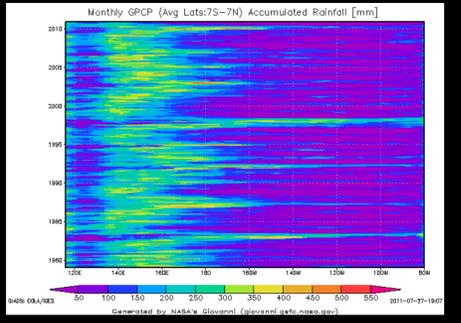
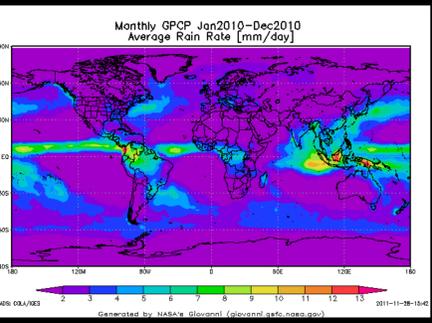
Click and drag to select area, or input latitudes (90, 90) and longitudes (-180, 180) or latitude and longitude ranges.

Users can generate plots or ASCII Output for area average (lat-long map), time series (Time Series), and histogram diagram. The generation is available for ASCII Map. Selecting any of the Help buttons will open a new window with detailed help. [More details about the data are also available.](#)

Alert: A new window may be opened when a link or a button is selected below.

Click and drag to select area, or input latitudes (90, 90) and longitudes (-180, 180) or latitude and longitude ranges.

Users can generate plots or ASCII Output for area average (lat-long map), time series (Time Series), and histogram diagram. The generation is available for ASCII Map. Selecting any of the Help buttons will open a new window with detailed help. [More details about the data are also available.](#)



Hovmöller latitude versus time diagram of the tropical Pacific ocean, showing seasonal and interannual variability of precipitation 1979-2010. Precipitation in this region is strongly influenced by El Niño - Southern Oscillation (ENSO) events; the brighter "stripes" extending to the east indicate an El Niño event.

The 30 years of GPCP Version 2.2 data allow time-series analysis. Top left: A well-known phenomenon is decreasing precipitation in northeastern China. Top right: In contrast to northeastern China, the southern provinces of China are experiencing increased precipitation.

## To be released: Inter-comparison of V6 and V7 TRMM

**TRMM V6 and V7 Intercomparison**  
This tool is for comparing TRMM V6 and V7 data products.

3A25 V6

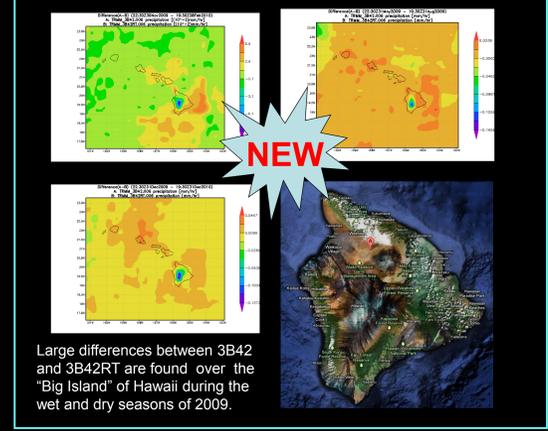
3A25 V7

3A25 (V6 - V7)



## New tool to be released: Inter-comparison of 3B42 and 3B42RT

Provides application users the ability to intercompare near-real-time (3B42RT) and research quality (3B42) rainfall products for product adjustments (i.e., biases).



For other examples, see companion poster, "Utilizing Precipitation Measurement Missions (PMM) Data in Applied Science Projects"

## Ongoing: Integrate IPWG Validation Algorithms into TRMM Online Visualization and Analysis System (TOVAS):

- Intercomparison of V6 and V7 TRMM (to be released in 2011)
- Intercomparison of daily rainfall products (to be released in 2012)
- Intercomparison of climatology products (to be released in 2013)

- TOVAS: <http://disc2.nascom.nasa.gov/Giovanni/tovas/>
- Mirador: <http://mirador.gsfc.nasa.gov/>
- GPCP 2.2 in TOVAS: <http://disc2.nascom.nasa.gov/Giovanni/tovas/rain.GPCP.shtml>
- PDISC Portal: <http://disc.sci.gsfc.nasa.gov/precipitation>
- Hurricane Data Analysis Tool: [http://disc.sci.gsfc.nasa.gov/daac-bin/hurricane\\_data\\_analysis\\_tool.pl](http://disc.sci.gsfc.nasa.gov/daac-bin/hurricane_data_analysis_tool.pl)
- TRMM Near-real-time Product in USDA Crop Explorer: [http://www.pecad.fas.usda.gov/cropeplorer/mpa\\_maps.cfm](http://www.pecad.fas.usda.gov/cropeplorer/mpa_maps.cfm)
- Current Rainfall Conditions: [http://disc.sci.gsfc.nasa.gov/agriculture/additional/tools/current\\_conditions.shtml](http://disc.sci.gsfc.nasa.gov/agriculture/additional/tools/current_conditions.shtml)
- TRMM Project home page: <http://trmm.gsfc.nasa.gov/>

Help Desk: [gsfc-help-disc@lists.nasa.gov](mailto:gsfc-help-disc@lists.nasa.gov)

TRMM FAQ: [http://disc.sci.gsfc.nasa.gov/additional/faq/precipitation\\_faq.shtml](http://disc.sci.gsfc.nasa.gov/additional/faq/precipitation_faq.shtml)